Incorporating "The Illuminating Engineer."

Light and Lighting

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Christmas, 1940

AS these words are written, we are approaching Christmas in the second year of war.

If, in the present circumstances, it is idle to wish our readers the conventional "Merry Christmas," it is yet permissible to convey our good wishes for some relief to them during this brief season of goodwill and to encourage hopes for the future. There are many who have suffered grief and loss, yet what great and solid ground for gratitude exists. It is not for nothing that Christmas happens so near to the shortest day of the year, that it heralds the gradual restoration of daylight, more precious to us than in normal times.

This return of light may well be a symbol of better things to come, an assurance of the preservation of things we hold dear, and of the ultimate return of tranquillity to this troubled world.

Contrast in Illuminating Engineering

A very entertaining meeting of the Illuminating Engineering Society took place in London on December 10. Mr. J. M. Waldram, Dr. R. G. Hopkinson, and Mr. W. R. Stevens had prepared an initial discourse, illustrated by experiments, on Contrast in Illuminating Engineering. (It was explained by the President that this item had been provided by the staff of the G.E.C. Research Laboratories in place of a visit, inevitably postponed owing to war conditions.) Dr. Hopkinson was unfortunately unable to be present, but Dr. Harper deputised for him efficiently at very short notice. A full account of the proceedings will appear in due course in the I.E.S. Transactions, and in our next issue we hope to include some account of the effective demonstrations by which the addresses were illustrated. These little interludes brought out the points made by the speakers very well. Another feature was the slick way in which each speaker took up the tale in turn. Briefly, these contributions aimed at bringing home the fact that contrast and its effects are based upon the impressions received by the eye and the mind. Being a sensation "contrast" cannot be expressed by a numerical formula, though various relations embodying the brightness of the object and its background give indications of the stimulus provoking this sensation. Very effective in this connection were the demonstrations, by means of illuminated photographs of outdoor scenes and lantern slides of lighted streets, how greatly the power to perceive contrast and detail depends upon the general order of brightness. In the course of the evening a report on fundamental factors underlying war time street lighting, prepared for the Joint Lighting Committee, was formally presented by Mr. P. Good. We give on pp. 196 and 198 a summary of this report, which is to be discussed in conjunction with Dr. Wright's forthcoming paper on a similar subject at the next meeting on January 14.

Retirement of Mr. C. W. Sully, Director of E.L.M.A.

The news of the retirement of Mr. C. W. Sully from the position of Director of the Electric Lamp Manufacturers' Association will be learned with general regret. Mr. Sully was associated with the formation of the E.L.M.A. in 1918, becoming vice-chairman in the following year, chairman in 1920, and director in 1923. He has thus been connected with the E.L.M.A. and its predecessor, the Tungsten Lamp Association, for over a quarter of a century. At a luncheon given at the Connaught Rooms on November 19, Mr. J. Y. Fletcher presiding, Mr. Sully was presented with a silver salver engraved with facsimile signatures and a complete set of the Encyclopaedia Britannica. To I.E.S. members the event is also of interest, for Mr. Sully has always taken a keen interest in the Society, of which he became president in 1933. He was largely responsible for initiating "Country Members," a departure which paved the way for the subsequent development of Local Centres.

I.E.S. North Midland Centre Informal Luncheon

Over a hundred members and guests were present at the informal luncheon arranged by the North Midland I.E.S. Local Centre in Leeds on November 11. Various organisations interested in lighting, including the E.C.A., E.D.A., E.L.M.A., and E.W.F., were represented. Others present included Mr. G. Guest, Director of Education in Leeds, and Mr. A. H. Owen, hon. secretary of the I.E.S. North-Western Centre.

The toast of "The Illuminating Engineering Society" was proposed by Mr. C. S. Shapley (Engineer and Manager of the Leeds Gas Department), who congratulated the society on the excellent work it was doing. He referred particularly to the problem of war-time street lighting, stressing the serious number of road accidents largely attributable to the black-out conditions. Mr. H. Dixon (President of the Institution of Gas Engineers and a member of the I.E.S. Council), in supporting the toast, likewise referred to the good work being done by members of the society both in connection with street lighting and in the industrial field, and congratulated local members of the centre on carrying on in spite of difficulties.

Mr. J. W. Howell (Chairman of the I.E.S. North Midland Centre), in responding, gave further particulars of war-time activities, and alluded to the co-operation of the Association of Public Lighting Engineers. Reference was made to the recently introduced regulations for industrial lighting and to the official recognition of the I.E.S. "Recommended Values of Illumination." Mr. Howell also reviewed the activities of the various local centres and sub-centres. He emphasised the important departure initiated in connection with "Fellowship" in the society, with its implied recognition of technical ability.

Dr. E. C. Walton (Vice-Chairman of the North Midland I.E.S. Centre), in proposing the toast of "The Visitors," also referred to the recognition of the I.E.S. code of lighting values and to the examinations in illuminating engineering initiated in 1939. He thought the Committee of the Centre could feel some pride in having kept members so well together and in persevering with meetings in these difficult times.

Mr. A. J. Connell (City Electrical Engineer for Halifax), in responding, thanked the I.E.S. for its hospitality, and emphasised the part played by good lighting in relation to industrial production and quality of work.

Top Window Space

Its Advantages and Drawbacks in "Blacking Out"

(*Communicated.*)

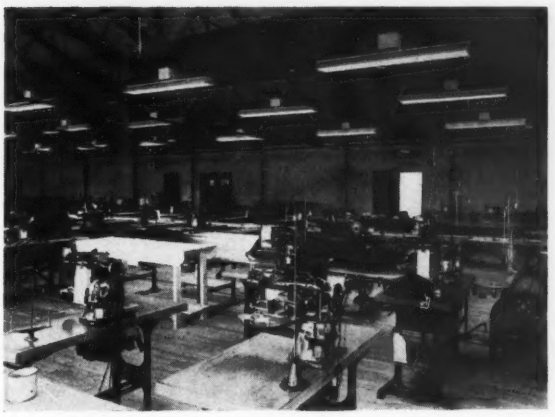
Admittedly the most useful portion of a window, from the standpoint of access of daylight into an interior, is the upper portion. In most cases this upper region contributes a very large proportion of the illumination available in parts of rooms most remote from the window. The distribution of daylight in a room lighted by windows on one side only is far from uniform—an excess of light immediately adjacent to the window and a great deficiency in parts most remote (which, in fact, in many city offices can rarely be used with comfort unless the daylight is supplemented by artificial light).

This may be due partly to the fact that only the upper parts of the window contain unobstructed sky. But this is only part of the story. In many city offices and factories the sky may only be visible from the vicinity of the window-sill. A more serious drawback is the fact that light from the lower window area strikes horizontal surfaces near the back of the room at a very oblique angle. It therefore produces only a feeble illumination on horizontal surfaces, besides producing troublesome shadows owing to its obliquity. Hence the utility of inclined mirrors or special prismatic glass. These help to "even out" the available illumination, directing into the back of the room rays which would otherwise never reach it, or, better still, directing light on to a white ceiling so that a useful downward reflected component is added.

If permanent blacking out is necessary, therefore, it would seem best to apply this to the lower portion of the window, equipping the upper part with adjustable shutters which facilitate access of natural light during the day.

Why, therefore, does one so often find exactly the opposite practice applied to side windows in factories? There are several possible reasons. In the first place, it is easier to manipulate an adjustable shutter at the lower level. Secondly, it is a usual plan in factories to find the heavier machinery in the centre of the room and bench work carried out in immediate proximity to the windows. Workers at these benches will not willingly tolerate blacking out of windows furnishing them with strong light, even though the provision of this may involve deprivation of light elsewhere. There is also a human craving for concrete evidence that "there *is* a sun still shining in the sky," which is less satisfactorily met when light enters only through the upper windows. This human craving may nevertheless prove a snare. Mr. C. A. Atherton has recently cited (Trans., Ill. Eng. Soc., U.S.A., Sept., 1940, p. 658) the case of a factory where the issue of slightly defective material was causing some anxiety. Every effort was made to improve the lighting of the inspection department, but without complete remedy. It was found, however, that the inspection girls worked more calmly and effectively at night. Investigation showed that they were distracted by variations in light and movements outside the windows during the daytime. A trial was made of closing the windows and using artificial light throughout the twenty-four hours. This proved to be the correct solution. The defects disappeared!

Fluorescent Tubes in a Clothing Factory



We give above a view of part of the works of Messrs. W. A. Smith and Co.'s factory, manufacturers of overalls, who are engaged on important Government clothing contracts. The "Bolenium" works illustrated have the distinction of being amongst the first in which the new 80-watt fluorescent "daylight" tubes have been installed on a large scale. In the main works bay 127 of these Royal Ediswan tubes, mounted in "industra" trough reflectors, have been installed. Offices and canteen are similarly equipped, an additional fifty tubes being in use. The units are mounted at a height of about ten feet, on approximately eight foot centres. The lighting scheme was designed by the Edison Swan Electric Co., Ltd., and installed by The County of London Electric Supply Co., Ltd. Operators appreciate the improved conditions, and it is reported that since the new installation was put into operation there has been a noticeable rise in output.

Protection of Glass in Factories

An Order on the above subject, applicable to all factories in which over 250 persons are employed, has been issued by the Ministry of Labour and National Service. An accompanying circular gives advice in regard to the choice of material. Generally speaking, the replacement of ordinary glass by translucent material which will not splinter is advised. Non-splintering glass is the best material, but textile substitutes are suitable for side windows and internal partitions. Specially strong substance is desirable for the replacement of roof glass.

As a preliminary to replacement it is necessary to consider how far glass can be obscured. As a rule, the total amount of daylight admitting roof glazing may be limited to 12 per cent. of the floor area, provided the distribution of daylight is reasonably uniform. For roof glass which can be permanently obscured fabric bitumen treatment should be applied. Additional protection may be provided by 2-in. mesh netting or ¾-in. mesh expanded metal. Under wired glass 2-in. mesh wire netting will afford sufficient protection. Protective measures should be inspected once a month. Reference is also made to methods of protecting vertical external glass and glass in doors and partitions.

It is evident that in many factories a considerable amount of trouble and expense may be involved if access of daylight is to be safely maintained. Nevertheless, in view of the benefits of access of daylight into factories, the effort involved is usually well worth while.

War-time Street Lighting and Aids to Movement in Streets

In what follows we give a summary of the Report on Fundamental Requirements, underlying the War-time Street Lighting prepared for the Joint Committee of the Ministry of Home Security and the Illuminating Engineering Society. The Report was formally presented at the I.E.S. meeting in London on December 10, 1940, and will appear in full in the Society's "Transactions."

The human eye can adjust itself to wide variations in degrees of brightness. The illumination received from summer sunlight may attain 10,000 ft.c., faint starlight may be of the order of 1/10,000th ft.c.—a range of about one hundred millions to one.

This study is devoted to vision at the lowest levels in this range of illumination which is all that is available out of doors on a clear moonless night and is of the same order as that furnished by war-time street lighting (0.0002 ft.c.).

Behaviour of the Eye in Weak Light.

The conditions characteristic of "twilight" vision are broadly as follows:—

(1) Complete dark-adaptation is only slowly attained by an eye previously adapted to normal illuminations. A person emerging from a brightly lighted room into a dark street requires some minutes before the eye can "take in" its surroundings. Thirty minutes is a reasonable time to allow for full adaptation. Such adaptation can be quickly destroyed. Momentary exposure of the eye to bright light will partly undo the results of a long period of waiting. Persons differ much in their speed of adaptation. Some, e.g. elderly people, approach the condition of "night blindness" and find great difficulty in finding their way in semi-darkness.

(2) At normal illuminations vision is most acute near the centre of the retina, which is normally exercised in the recognition of form. With twilight vision this area is relatively insensitive. Two consequences follow:—

(i.) Objects are no longer perceived by direct vision, but "out of the tail of the eye."

(ii.) The outlines of objects are never seen with the same clarity as by normal vision; they tend to appear as masses, limits of which are less clearly defined.

(3) At the low order of illumination characteristic of twilight vision, colours can no longer be distinguished.

Visual Sensitivity at Low Levels of Illumination.

State of Adaptation.

The provision of even a weak degree of general illumination shortens the period of adaptation and fixes the order of brightness to which the eye must adjust itself, having thus a certain stabilising influence. When exposed to a certain illumination—even if only of a low order—the hyper-sensitiveness of the eye characteristic of complete dark adaptation is less marked and the effect of exposure to an object of moderate brightness less severe. Therefore, the first essential is to abstain from any action liable to impair sensitiveness of the retina. Not merely should extreme conditions of dazzle, creating momentary semi-blindness, be avoided; one should also avoid any condition of excessive contrast such as may depress the action of the eye and prevent it getting the full value of the weak illumination available.

Limits to Brightness.

At very low illuminations new standards are necessary. At normal illuminations, say, about 5 ft.c., there are recommendations that within the direct range of vision (a) the brightness of no object should exceed 5 candles per square inch, and that (b) the variation in brightness of objects within this range should not exceed 100:1.

Application of the rule quoted above to conditions met with in areas receiving an illumination of 0.002 ft.c. would give a limiting brightness of 0.002 candles per square inch, roughly equivalent to 0.1 equivalent foot-candles. Adoption of the 100 to 1 ratio, on the other hand, would give a brightness of about one-fifth of this, namely 0.02 e.f.c.

Size of Object.

At these weak illuminations seeing is effected by the peripheral region of the retina, where perception of form is less acute. Only the broad shapes of things at close quarters can be seen. The image of an object subtending at the eye an angle less than 2 to 3 degrees is liable to fall inside the central region of the retina when it becomes invisible. Objects of this size cannot be seen with certainty. They "appear and disappear" as one is looking at them. Moreover, impressions may depend upon the product of area and brightness. Larger objects appear brighter than small ones, which again enhances their visibility.

Importance of Contrast.

Another factor of vital importance is the ratio of brightness between object and its background. At high illuminations, under very favourable conditions, a difference in brightness of only one to two per cent. can be detected. At very weak illuminations a difference of 20 or even 30 per cent. can scarcely be detected with certainty. An object of quite substantial size which reflects only 20 per cent. less or more than the adjacent roadway and receives an illumination of only 0.0002 ft.c. might easily escape recognition.

In order to ensure that an object may be visible it is therefore expedient (i.) to ensure, if possible, that the angle subtended at the eye is well outside 3 degrees; (ii.) to secure a relatively high contrast with its background, and at the same time (iii.) to guard against the possibility of depressing vision by *excessive contrast*, so great as to approach glare conditions.

Colour.

It is evident that it is of no use, at a very low order of brightness, to rely on colour as a means of distinction, since colour as such can no longer be distinguished. Moreover, a red object, such as a pillar box, becomes indistinguishable from a dark background. Objects desired to stand out from their dark surroundings at low illuminations, and which are identified by their colour under normal conditions, should preferably be painted green or blue. The sensitiveness of the eye to blue light is accentuated at very low illuminations. Yet the use of such light in preference to white light is not advantageous. The general use of pure blue light involves considerable absorption, and is therefore uneconomical, and for some purposes it is considered inexpedient owing to certain loss in sharpness of outline of objects illuminated when viewed from some little distance away.

Applications.

The utility of an illumination of the order of 0.0002 ft.c. depends entirely on the avoidance of factors liable to depress visual sensitivity. It is desirable to

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do everything possible to facilitate the transition from the brightness indoors to the relative obscurity outside. Light traps, besides their primary object of preventing escape of light from within, have a secondary field of utility—in providing a period of adaptation. If behind an entrance there were a short passage or ante-room where the illumination was graduated by steps from the full illumination inside (say, 3-5 ft.c.) down to, say, 0.02 ft.c. at the threshold where, if possible, one should linger for a short time the final transition down to 1/10,000th or less of the original illumination would be rendered easier and the period of subsequent adaptation shortened. In any case, a wait of a few minutes is desirable before movement is made.

The next step is to avoid the presence of objects of undue brightness out of doors. Headlights and traffic control signals, the power of which is necessarily fixed at a value far exceeding that necessary for the recognition of objects at short range, inevitably give rise to some degree of glare. In both cases, however, control of the beam and the adoption of screens and masks does much to mitigate the trouble. It is chiefly when regulations are disregarded that serious glare is liable to arise.

Objects of "Undue Brightness."

For all classes of users, however, the presence of unduly bright objects in the field of view is a drawback. Indications of limiting brightness have been quoted. At this low level of illumination higher values might perhaps be permitted. It is, however, interesting to observe that the first of these values (0.1 e.f.c.) is the maximum assigned to illuminated A.R.P. signs (BS/ARP 32) as a result of long and continued and careful experimental investigation, whilst the second is exactly that specified in the Lighting Restriction Order as the limiting brightness of illuminated display signs. Hence there seems good ground for the adoption of a value of brightness of the order of *0.05 to 0.1 e.f.c.* as a limit in streets—especially as these limits have been independently determined with a view to restricting conspicuousness from the air.

It may be useful to apply this yardstick to luminous objects commonly met with in streets. Reference has been made above to motor car *headlights* and *luminous traffic signals*. The position in regard to *rearlights* and *side lights* is possibly different. Their effectiveness is properly defined in terms of *brightness* limited by the use of suitable diffusing media. Other devices, such as the use of a concealed light under the body of the car showing its breadth by silhouette or the application of indirect lighting to the back surfaces of cars, might well be explored and the liability to glare diminished.

Lights indicating the positions of *refuges and obstructions* frequently offend by their glare, making it difficult to distinguish outlines of adjacent objects. The Restrictions on Lighting Order No. 74, 1940, specifies a brightness for the "cross" of 0.5 candles per sq. ft. (roughly 1.5 e.f.c.), which is 15 times the extreme limit proposed above. (Experience suggests that this value is often greatly exceeded.) The same applies to red lights indicating obstructions. The limitation to 1 c.p. (probably also little observed in practice) is not accompanied by any restriction in brightness, and the presence of such lights may actually impede observation of the limits of the obstruction. From a visual standpoint requirements would be better met by ensuring that objects are provided with a low illumination enabling them to be recognisable, and that the brightness of any signal light, intended to give warning at a distance, does not exceed the limits specified above.

The *torches* commonly used by pedestrians have likewise great drawbacks. The concentrated beam they provide produces an illumination at once uneven and in excess of that needful. They would be more serviceable if constructed in a box form with no lens but a light-giving area of several square inches giving diffused light of low brightness but even quality, and equipped with a hood in order to render the emission of light above the horizontal improbable.

Application of Theory to Size and Contrast of Objects in Streets.

At weak illuminations a degree of contrast much beyond that ordinarily sufficient may be necessary in order to enable even objects of substantial size to be seen. The images of objects subtending less than about 3° at the eye are liable to be received on the insensitive area and escape notice. Now 3° represents about 2½ ft. at a distance of 60 ft. It is, therefore, expedient that obstructions should be illuminated over an area having at least this linear dimension. It is also desirable to increase the available *brightness* whenever it is expedient to do so. By selecting *materials of high reflecting power* we may sometimes achieve results as good as if ten times the illumination on a relatively dark material were provided.

The area of darkest tone commonly met with in the street is the road surface. A city pavement, in general, comes conveniently about mid-way between this and white paint, and therefore affords a moderately good background both for the figures of persons in dark clothing and for obstacles treated with this material. White paint used with discretion at *busy crossings* and on *vertical surfaces* such as walls and railings, etc., enables persons crossing the roadway to be more easily seen.

The extensive whitening of the kerb both on the horizontal, and for drivers of vehicles and persons on the other side of the road, the value of the whitening of the *vertical surfaces of kerbs* has proved itself. The application of white paint to motor vehicles is also useful, but should be applied to a much greater area than is at present usual.

Contrasts in brightness play an important part in creating a sense of perspective and enabling people to "size up" their position. This is illustrated by the admitted value under conditions of war-time street lighting of the circular white rings on tree trunks. There seems every reason to exploit to the full the revealing value of white surfaces placed at corners, and similar devices which show up in a headlight beam. Wider use might also be made of *directive reflecting surfaces*, as commonly used for warning signs, etc.

On the other hand, *isolated bright spots of light*, such as the luminous crosses on islands (and, in some cases, the rear lights of motor vehicles), may, unless carefully controlled, destroy perspective and may render it most difficult for the user of the roadway to see what is beyond them.

Controlled Local Brightness.

There have been suggestions in regard to various forms of local lighting (e.g. restricted beams of light). Experience seems to have proved the fundamental value of a *uniform level of illumination* with, so far as possible, no regions of complete darkness.

The measure of illumination provided by war-time street lighting, though so small, is of appreciable benefit, especially when applied on a large scale. It affords a ground work on which the eye can build up impressions from any extra casual light it may receive.

It would, however, add to amenities in the streets if somewhat *higher illuminations*, under proper control, or suitably screened, could be adopted *locally* in certain instances.

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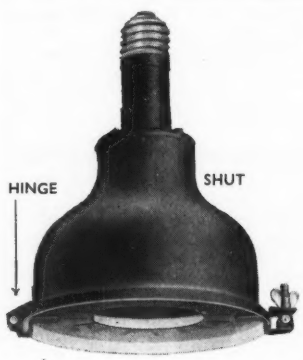

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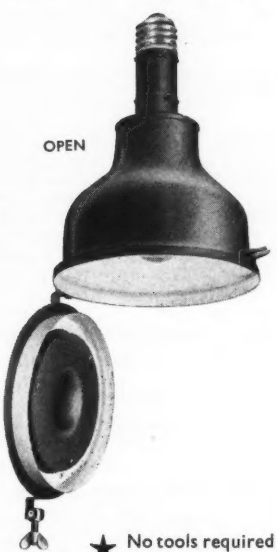

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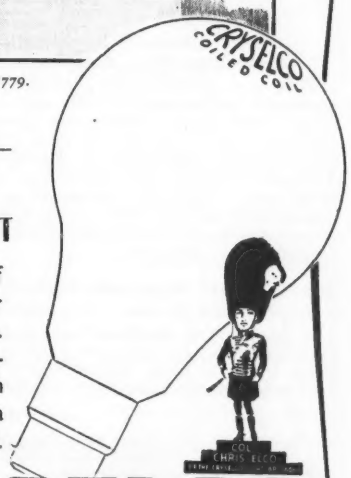

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Literature on Lighting*

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from page 184, November, 1940.)

II.—PHOTOMETRY.

224. A Precision Integrating-Sphere Densitometer.

J. G. Frayne and G. R. Crane. J. Soc. Mot. Pict. Eng., Vol. 35, pp. 184-200, August, 1940.

A densitometer employing an integrating sphere associated with a high-gain amplifier is described. Densities up to 3.0 are read directly on a multiple-scale logarithmic meter. Visual diffuse operation is attained by simulating average eye characteristic by inserting appropriate filters in the optical bath. R. G. H.

225. Residual Photometric Errors in the Commercial Recording Spectrophotometer.

O. W. Pineo. J. Op. Soc. Amer., Vol. 30, pp. 276-289, July, 1940.

Recommendations are given for the reduction of stray light errors in the recording spectrophotometer and for compensating remaining errors. The resulting accuracy can be brought within the tolerances of direct visual measurements. O. E. S.

IV.—LIGHTING EQUIPMENT.

226. Fittings for Industry.

Anon. El. Rev., Vol. CXXVII., No. 3,276, p. 191, September 6, 1940.

Describes, with photographs, a very wide selection of fittings for industrial lighting, and the accessories developed for these fittings. Reflectors for 80 watt fluorescent tubular lamps and adjustable fittings for local lighting are featured. R. G. H.

227. Fluorescent and Phosphorescent Paint for A.R.P. Purposes.

British Standard Specification BS/ARP 18. July, 1940: Elec. Rev., Vol. CXXVII., p. 304, Oct. 11, 1940.

This is a revised version of the previous edition which appeared in December, 1939, and is extended to cover paints other than those furnishing greenish colours. The chief feature is the presentation of a new basis of measuring low brightnesses, applicable to surfaces giving light of widely different colours, and involving a new unit of "effective brightness." The description of a brightness gauge, in the appendices, is amplified and a new appendix explaining the consequences of the Purkinje effect in the measurement of brightness is included. R. G. H.

228. "Davit" Standards Light Amusement Park Area.

Anon. El. World, 114, p. 697, September 7, 1940.

A photograph and brief description are given of a lighting standard used for outdoor lighting in America. It is a one-piece tube, in form resembling a ship's davit, to the upper end of which the lighting fitting is attached. S. S. B.

V.—APPLICATIONS OF LIGHT.

229. Lighting and Eyesight.

Editorial. Elect., 125, p. 200, October 18, 1940.

The relation of lighting and eyesight is discussed. It is pointed out that good lighting should give sufficient light for the efficient conduct of any operation. The degree of goodness to the actual worker will depend upon the nature of the job, his age, and the extent of his eyesight faults. It cannot be claimed that modern lighting can perfect the efficiency of defective sighted workers, but there is every reason to believe that a good lighting system will postpone eyesight faults which develop under certain industrial processes and with advancing age. C. A. M.

230. A Lighting Review.

Anon. Magazine of Light, IX., No. 7, pp. 23-41, September, 1940.

Photographs with descriptions are given of a large number of lighting installations. The collection covers widely differing requirements, and includes the use of both tungsten and tubular fluorescent lamps. C. A. M.

231. Industrial Lighting.

A. D. S. Atkinson. El. Rev., Vol. CXXVII., No. 3,276, p. 189, September 6, 1940.

The Factory Lighting Committee's Report is discussed from a practical angle, with photographs. Methods of obtaining glare-free lighting are discussed, and the advantages of large, low-brightness laylights pointed out. Problems of the exterior lighting of factories, yards, etc., are referred to. R. G. H.

232. Factory Lighting Regulations.

Anon. El. Rev., Vol. CXXVII., No. 3,283, p. 351, October 25, 1940.

A summary is given of those recommendations of the Departmental Committee on Factory Lighting which have been adopted by the Ministry of Labour and National Service. R. G. H.

233. Protective Lighting for Industrial Plants.

J. A. Summers. El. World, 114, p. 846, September 21, 1940.

Suggestions are given for the types, sizes, and location of lighting units for providing protection to industrial plants by line, fence, and general yard lighting, as well as for special conditions and surroundings of yard. S. S. B.

234. Eighty-five Foot-Candle Draughting Room Lighting.

Walter J. Leemhuis. El. World, 114, p. 683, September 7, 1940.

The lighting system adopted for an American draughting room described used fluorescent tubular discharge lamps in continuous troughs with vertical louvres in the ceiling. A semi-matt white vitreous enamel reflecting surface is used. The horizontal illumination on the working plane was increased to 85 ft.c., compared with 11 ft.c. originally obtained, using the same total wattage of filament lamps in diffusing units. The uniformity and comfort of the new lighting system has been specially noted. S. S. B.

235. Hundred Foot-Candles of General Lighting.

E. J. Planert. Magazine of Light, IX., No. 7, pp. 15-16, September, 1940.

Details with a photograph are given of a lighting installation in a hosiery works. Fluorescent tubular lamps are used, and the resulting illumination value on the work in 100 ft.c. C. A. M.

236. What Lamps Where.

Anon. El. World, 114, p. 886, September 21, 1940.

A table is given showing the type of lamp and the general level of illumination recommended by American lighting engineers for different localities. S. S. B.

237. Vehicle Platform Lighting.

Anon. El. Rev., Vol. CXXVII., No. 3,276, p. 190, September 6, 1940.

The experimental work conducted by London Transport to decide optimum illuminations for vehicle "steps" has resulted in a maximum illumination of 0.1 ft.c. on the "step" being permitted. The Ministry of Home Security is issuing detailed instructions to the authorities. R. G. H.

238. Office Lighting.

G. G. Fletcher. Magazine of Light, IX., No. 7, pp. 10-12, September, 1940.

Numerous photographs with details are given of new lighting equipment of a large insurance office building in Iowa. The coffer lighting system with bowl silvered lamps is used extensively. C. A. M.

239. Street Lighting in War-Time.

E. E. Hoadley. El. Rev., Vol. CXXVII., No. 3,276, p. 200, September 6, 1940.

The low-level street lighting (0.00025 ft.c.) permitted last winter is considered to be worth while for the pedestrian.

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*We take this opportunity of acknowledging the services of the following members of the Illuminating Engineering Society who have contributed items to "Lighting Literature" during the past year: S. S. Beggs, W. E. Harper, R. G. Hopkinson, C. A. Morton, A. E. Schuil, J. Score-Smyth, W. R. Stevens, and H. J. Turner.

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although of little value to the motorist. No increase can reasonably be permitted, however. The author is in favour of installing low-level lighting. R. G. H.

240. Grounded Cut-Outs Improve Street Lighting Service.

W. H. McKinley. El. World, 114 p. 534, August 24, 1940.

Details are given of a cut-out for use on series burning lamp circuits, by means of which the difficulty of having lights out of service by reason of two unlocated ground faults occurring on the circuit is eliminated. This is achieved by providing a known ground, which can be disconnected. S. S. B.

241. Lighting in the Home.

M. Forrest. El. Rev., Vol. CXXVII., No. 3,276, p. 197, September 6, 1940.

The psychological value of good lighting in the home during war-time is pointed out. Methods of black-out are given, and the problems of home lighting discussed from a general point of view. R. G. H.

242. Lighting Restrictions.

J. F. Stanley. El. Rev., Vol. CXXVII., No. 3,276, p. 195, September 6, 1940.

A summary and explanation of the various BS/ARP lighting specifications. The new unit of "effective brightness" is discussed in relation to BS/ARP 18 (luminescent materials). R. G. H.

243. Domestic Uses of Electricity in War-Time.

Caroline Haslett. El. Rev., Vol. CXXVII., No. 3,281, p. 299, October 11, 1940.

One considerable advantage of electric lighting in war-time is its portability, and the simplicity with which an air-raid shelter can be lighted. R. G. H.

244. Fluorescent Lighting in Schools.

Anon. Elect., 125, p. 201, October 18, 1940.

Details with a photograph are given of a fluorescent lighting installation in a class-room in a school in Pennsylvania. C. A. M.

CORRESPONDENCE

Cylindrical Web for Isocandles

Dear Sir,—I was interested to read the account in your last issue of the article by Dr. Monash advocating the use of the cylindrical web for isocandle diagrams. This proposal is, of course, far from new, and it has been generally rejected in favour of the sinusoidal projection on account of the very severe distortion of the contours which occurs at angles of more than about 45 deg. from the "equator." This can be seen quite clearly if a given isocandle diagram is drawn on both forms of web (see, e.g., "Photometry," pp. 89-90). The chief—in fact, I would venture to say the *only*—advantage of the cylindrical web is the greater ease with which it can be constructed, but since sheets printed with the sinusoidal web have been made available commercially, this advantage has largely disappeared. It would, I think, be unfortunate if we lost, for no good reason, the present uniformity of method of presenting isocandle diagrams.

I am, yours truly,

JOHN W. T. WALSH.

Messrs. William Sugg and Co., Ltd.

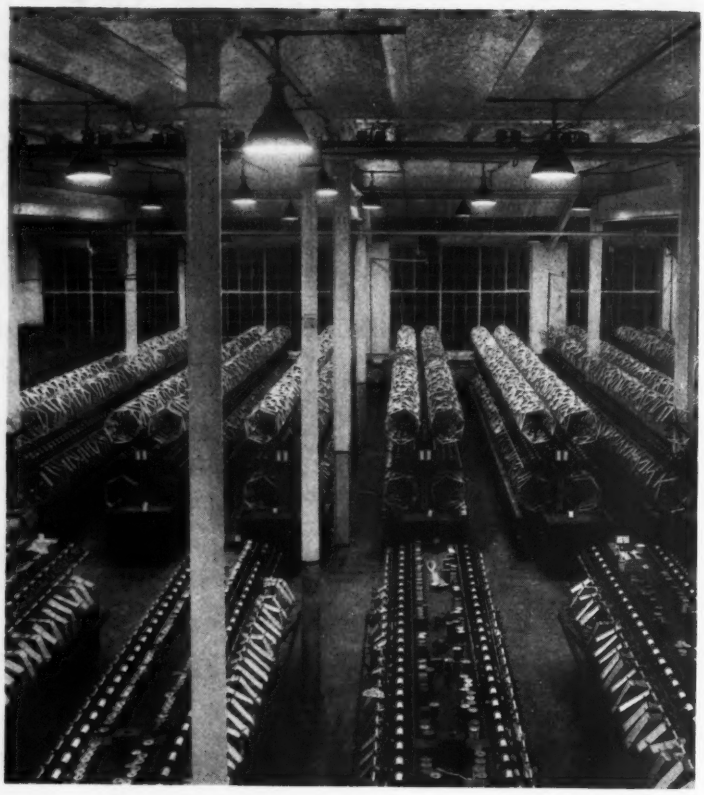
Some readers of this journal will doubtless have learned with regret of the recent damage suffered by Messrs. William Sugg and Co., Ltd., at their Vincent Works, and will join us in expressing sympathy with the firm. We are glad to be able to announce, however, that Messrs. Sugg and Co. are in a position to continue to execute orders for their gas appliances without delay.

A New Lighting Standard for Welfare and Production

A useful pamphlet, from which the accompanying illustration has been taken, has been recently issued by the E.L.M.A. Lighting Service Bureau under the above title. This serves to make known the recently announced statutory regulations on factory lighting. Attention is drawn to I.E.S. "Recommended Values of Illumination," mentioned specifically in the fifth report of the Departmental Committee. This committee's remarks on suitability of lighting are also recalled. A table is presented showing the mounting heights advisable for fittings taking lamps of from 60 to 1,500 watt capacity. Observance of these will go far towards elimination of glare.

It is emphasised that better lighting does not necessarily mean a completely new installation. Existing equipment can often be rearranged and modified to meet the new conditions. Electric discharge lighting may often be used with advantage, e.g., where, by their use, extensive alterations in existing wiring, etc. (which may involve delay), can be secured; the extra heat of additional tungsten lighting would impair the efficiency of ventilation; the overall savings due to current reduction would recover the extra capital and lamp replacement costs of discharge lamps within two years; and where discharge lighting has definite and accepted merits for the solution of a special lighting problem.

Finally, a reminder is given of the formation of the National Industrial Electric Lighting Service, at 2, Savoy-hill, London, W.C.2, from whom advice on lighting problems may be obtained.



An effective example of overhead electric discharge lighting: no local lighting is necessary.

War-time Street Lighting

The policy to be observed in connection with war-time street lighting has recently been the subject of some discussion, in view of the air raids recently experienced by this country.

In this journal the view has been consistently expressed that war-time street lighting is of inestimable value under such conditions, and we gladly give publicity to the following letter expressing the views of the Chairman of the Joint Lighting Committee on this subject:—

J. S. Dow, Esq.,
The Illuminating Engineering Society,
32, Victoria-street, S.W.1.

Dear Mr. Dow,

WAR-TIME STREET LIGHTING.

We have received a number of inquiries recently as to the policy of the Ministry of Home Security in connection with street lighting in view of the prevailing heavy air raids. In this connection we have received no indication from the Ministry that they have altered their view, that street lighting may be permitted in accordance with the Lighting (Restrictions) Order, 1940, and I think the members of the Street Lighting Sub-Committee might like to know this.

I think they might also be interested in the following extract from a letter we have received from Mr. J. F. Colquhoun, the Lighting Engineer of the City of Sheffield:

"As you know, I have now 25,000 street lamps in use in Sheffield. Aerial observations were taken on the 8th, 9th, and 11th October. I have now received a copy of the Flight-Lieutenant's report, and I think you would be interested in hearing what he says about the street lighting.

"'Street lighting at Sheffield was extremely well blacked out, and great care must have been taken, as I was unable to observe any illumination from this cause.'"

I suggest this also be brought to the attention of the Street Lighting Sub-Committee, and that it be given due publicity.

Yours faithfully,
P. GOOD,
Chairman Joint Lighting Committee.

Obituary

Mr. C. Valon Bennett

We record with regret the death of Mr. C. Valon Bennett, engineer, general manager, and secretary of the Rochester, Chatham, and Gillingham Gas Company. Mr. Bennett was a leading member of the Institution of Gas Engineers, of which he became President, and had been for a number of years a member of the Illuminating Engineering Society. His sagacity and sincerity of purpose commanded general esteem and served him well, both in his administrative work at home and in the course of international gatherings. His loss will be widely regretted by his many friends, both within and outside the gas industry.

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I.E.S. Notices

APPLICATIONS FOR MEMBERSHIP

Elections Pending

At the last meeting of the Illuminating Engineering Society on December 10 the names of the following applicants for membership were presented for the first time:—

CORPORATE MEMBERS:—

Benson, W. A. .....c/o Crompton Parkinson, Ltd., 1-3, Brixton Road, LONDON, S.W.9.

Chasteney, H. E. .....H.M. Deputy Chief Inspector of Factories, Cleland House, Page Street, LONDON, S.W.1.

Craven, J. C. .....5, Broomfield Crescent, LEEDS.

Fowler, E. A. .....79, Alwoodley Lane, Alwoodley, LEEDS.

Gorringe, R. G. .....7, Cartside Street, MANCHESTER.

Hammersley, R. G....Electricity Department, Gainsborough, LINCS.

James, D. L. .....71, Wordsworth Avenue, Penarth, GLAM.

Laithwaite, G. R. ...Poplars, Sparkin, Worksop, NOTTS.

Lightbody, C. .....119, Birchfields Road, Longsight, MANCHESTER.

MacGregor, A. .....71, Waterloo Street, GLASGOW.

Mackley, P. .....131, Mather Avenue, LIVERPOOL.

Page, E. P. .....Sea-Crest, Cliff Parade, Penarth, GLAM.

Shorney, H. C. .....11, Wykin Road, Hickley, LINCS.

Selby, H. E. W. .....7, Victorian Crescent, DONCASTER.

Tabraham, D. L. .....General Electric Company, Ltd., NEWCASTLE.

Toner, M. C.....7, Silver Hill Road, Ecclesall, SHEFFIELD.

COUNTRY MEMBERS:—

James, W. E. .....Revo Electric Company, Ltd., 31-33, Frederick Street, CARDIFF.

Jones, H. R. .....25, Dorchester Avenue, Penylan, CARDIFF.

Markwick, A. S. .....25, Newcastle Drive, The Park, NOTTS.

Taylor, C. .....288, Sinsworth Road, Bury, LANCS.

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Gordon, F. .....5, Lonsdale Road, Fallowfield, MANCHESTER.

Hodson, N. C. .....Oak Leigh, Portland Road, Bowden, CHESHIRE.

Lovell, R. A. .....Crompton Parkinson, Ltd., 960, Bristol Road South, Northfield, BIRMINGHAM.

Palin, F. J. .....17, Swinbourne Grove, Withington, MANCHESTER.

Wackrow, V. .....5, Glas Teilo, Whitchurch, CARDIFF.

Elections Completed

Applicants whose names had been presented at the previous meeting on October 22 ("Light and Lighting," November, 1940, p. 186) were again presented and were formally declared members of the Society.

I.E.S. FELLOWSHIP

The Board of Fellows of the Illuminating Engineering Society has recommended the election of the following as Fellows of the Society, and this recommendation has been approved by the Council:—

Bright, Harold .....5, Bloomsbury Square, LONDON, W.C.1.

Catten, T. .....98, Thistledene, Hampton Court Way, East Moseley, SURREY.

Cocksedge, F. M. .....Maryfield, Osborne Road, Potters Bar, MIDDX.

Daniel, R. W. .....Bermays, The Park, Gt. Bookham, SURREY.

Horsfall, A. V. .....7, Baronsmede Court, Ealing, LONDON, W.5.

Middleton, F. F. .....Caynton, Foley Road, Redmore, STOURBRIDGE.

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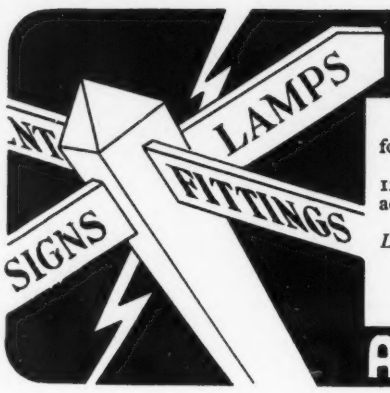

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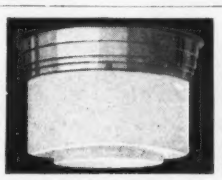

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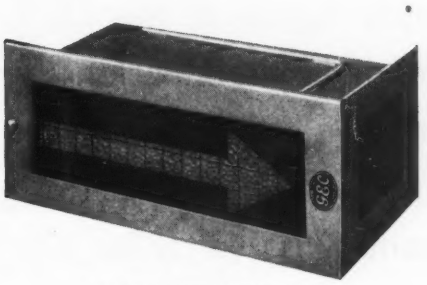

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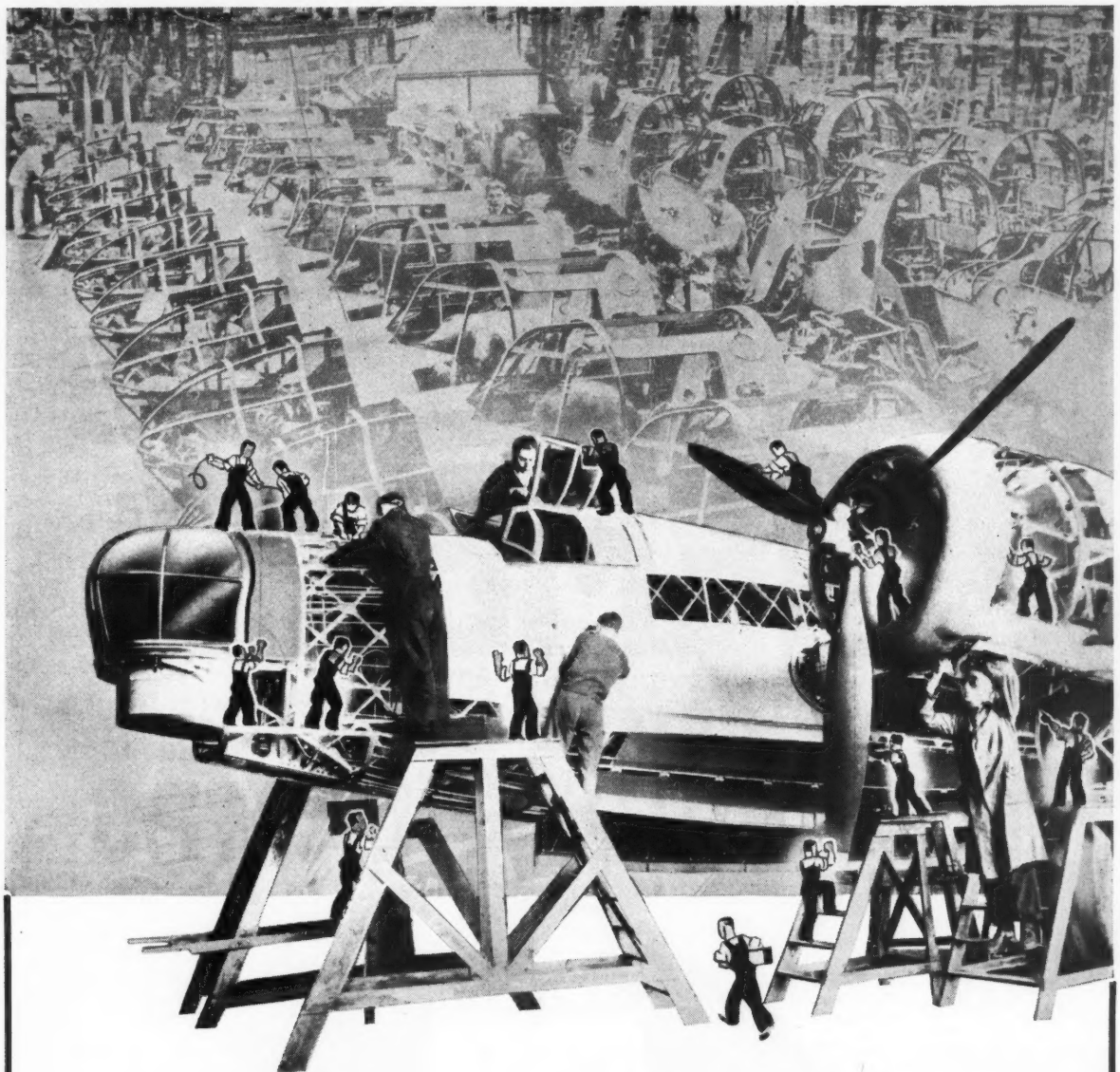

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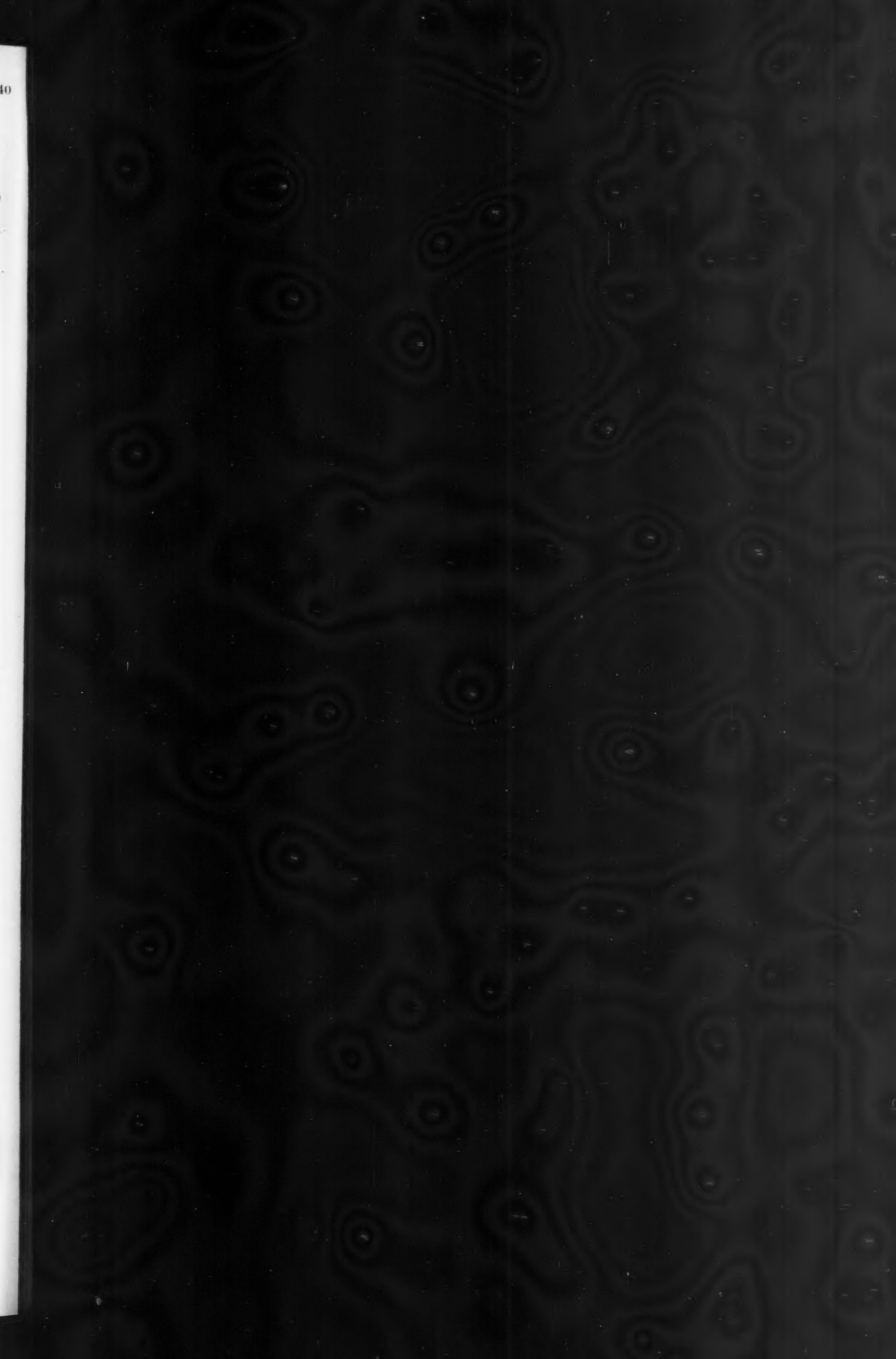

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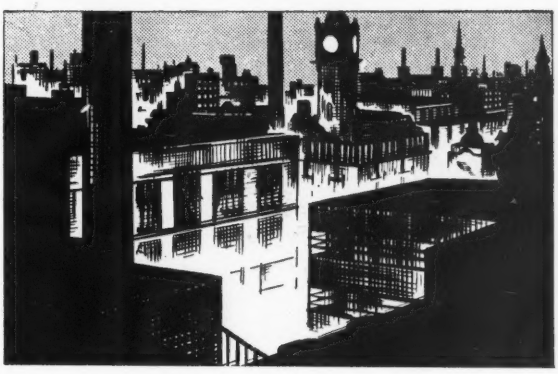

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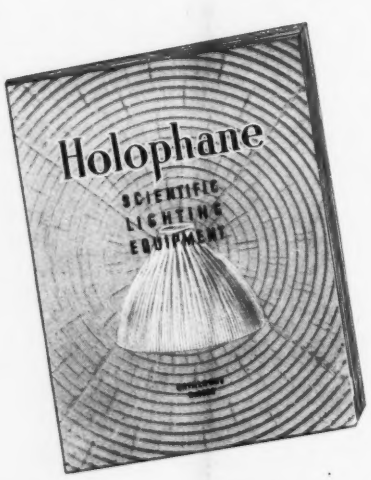

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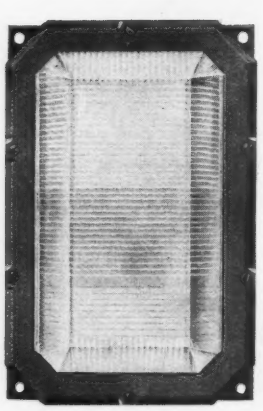

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